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Long-term variations in the critical frequency of the midlatitude F2 layer at noon

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Abstract

Based on an analysis of the midday data of the midlatitude ionospheric stations in the Northern Hemisphere, it is indicated that the quiet monthly median f0F2m depends also on the relative sunspot number R×averaged for 11 years: an increase in R×results in decreasing f0F2m two years later. This dependence is shown to be the main cause of long-term f0F2 variations at all longitudes. On this basis, it is assumed that long-term variations in the solar UV radiation flux and (or) in the thermospheric parameters should depend on R. It is indicated that a linear time variation (trend) of the relative f0F2 values is a less important cause of the longterm variations in f0F2. This ionospheric trend is found to be longitude-dependent: it is significant and maximal at longitudes of 100°-290° E and virtually absent over Europe. This effect is apparently associated with the fact that the ionospheric trend is the sum of trends caused by the greenhouse effect P and the secular variations in the magnetic field M. The trends in P and M are shown to be insignificant, but their sum results in a significant trend at certain longitudes.